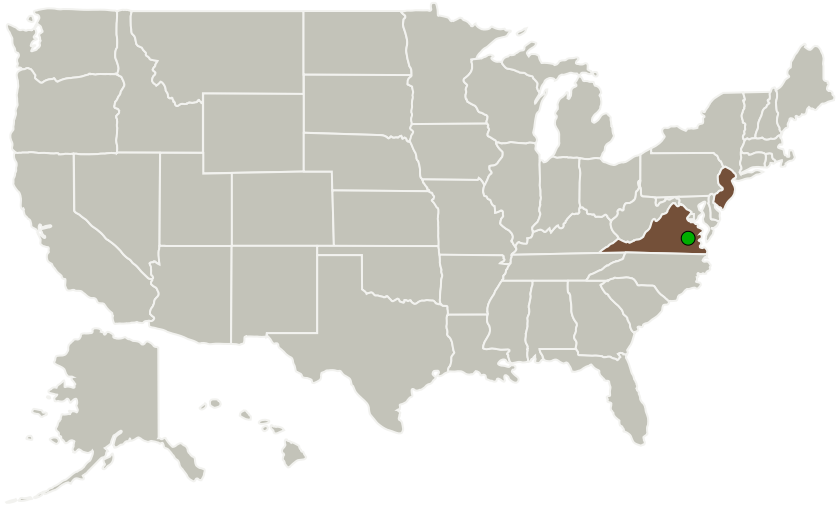
2 Micron Wavelength Coherent Universal LIDAR With Adjustable Resolution and Sensitivity, Phase I

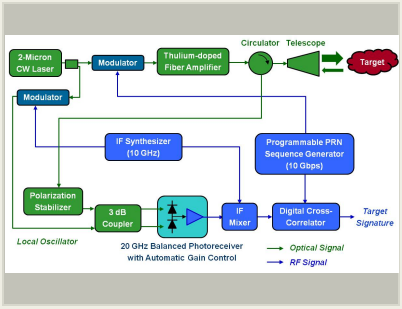
Completed Technology Project (2017 - 2017)

Project Introduction

Discovery Semiconductors and Lockheed Martin Advanced Technology Laboratories have teamed together to design a Universal LIDAR system that will work for NASA's diverse range of applications. We propose a fiber-based, self-heterodyne LIDAR, at 2050 nm wavelength, whose transmitted optical signal is modulated by a 10 Gbps programmable pseudo-random (PRN) sequence. The LIDAR's resolution and sensitivity will be tuned by choosing the appropriate PRN sequence. A PRN length of 1 will provide the finest resolution of 1.5 cm with 1 uW sensitivity. Increasing the PRN length to 100,000 will improve the sensitivity to 10 pW for 1.5 km resolution. Several NASA applications will be covered by the new innovation including: 1) Thermometry and spectroscopy of rocket plumes and jet engine flames with cm scale resolution, 2) Laser Doppler Velocimetry in Hypersonic wind tunnels up to Mach 20, 3) Navigational LIDARs for planetary landing mission that need velocity and altitude measurements with sub-meter accuracy, 4) Clear air turbulence measurements having 10 m or higher resolution, and 5) Space based wind LIDAR for environmental sensing having 1 km resolution. Our Phase I work will result in detailed LIDAR design, which will be corroborated by experimental demonstration of resolution-sensitivity trade.

Primary U.S. Work Locations and Key Partners





2 Micron Wavelength Coherent Universal LIDAR With Adjustable Resolution and Sensitivity, Phase I Briefing Chart Image

Table of Contents

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
Discovery Semiconductors, Inc.	Lead Organization	Industry Minority-Owned Business	Ewing, New Jersey
Langley Research Center(LaRC)	Supporting Organization	NASA Center	Hampton, Virginia

Primary U.S. Work Locations	
New Jersey	Virginia

Project Transitions

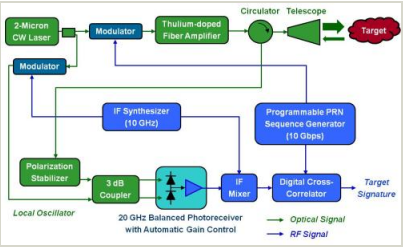
June 2017: Project Start

December 2017: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/140763)*

Images



Briefing Chart Image
2 Micron Wavelength Coherent Universal LIDAR With Adjustable Resolution and Sensitivity, Phase I Briefing Chart Image *(https://techport.nasa.gov/image/127451)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Discovery Semiconductors, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

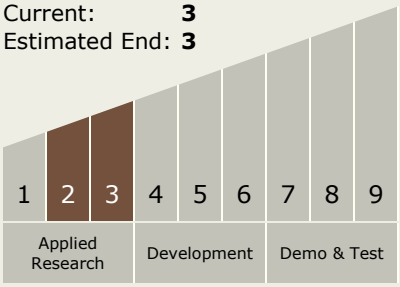
Carlos Torrez

Principal Investigator:

Shubhashish Datta

Technology Maturity (TRL)

Start: **2**
Current: **3**
Estimated End: **3**



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Technology Areas

Primary:

- TX08 Sensors and Instruments
  - TX08.1 Remote Sensing Instruments/Sensors
    - TX08.1.5 Lasers

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System